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General Notes.

GEOLOGY AND PALEONTOLOGY.

Geologic Time indicated by the Sedimentary Rocks of North America.—Various geologists have speculated as to the age of the earth, basing their estimates on both geologic and paleontologic data. The latest contribution to the subject is from Dr. Charles Walcott. His unit is the age of the Paleozoic rocks of the Cordilleran area in western North America. A careful consideration of all the factors of denudation and deposition leads him to consider that it would have required 17,500,000 years for the deposition of the calcium and the mechanical sediments of Paleozoic time. He concludes his paper as follows:

“Taking as a basis 17,500,000 years for Paleozoic time, and the time ratios 12, 5 and 2 for Paleozoic, Mesozoic and Cenozoic (including Pliocene) respectively, the Mesozoic is given a time duration of 7,240,000 years, the Cenozoic of 2,900,000 years, and the entire series of fossiliferous sedimentary rocks of 27,650,000 years. To this there is to be added the entire period in which all of the sediments were deposited between the basal crystalline archæan complex and the base of the Paleozoic. Notwithstanding the immense accumulation of mechanical sediments in this Algonkian time, with their great unconformities and the great differentiation of life at the beginning of Paleozoic time, I am not willing, with our present information, to assign a greater period than that of the Paleozoic—or 17,500,000 years. Even this seems excessive. Adding to it the time period of the fossiliferous sedimentary rocks, the result is 45,150,000 years for post-Archæan time. Of the duration of Archæan or pre-Algonkian time, I have no estimate based on a study of Archæan strata to offer. If we assume Houghton’s estimate of 33 per cent. for the Azoic period and 67 per cent. for the sedimentary rocks, Archæan time would be represented by the period of 22,250,000 years.

“In estimating for the Archæan, Houghton included a large series of strata that are now placed in the Algonkian of the Proterozoic of the U. S. Geol. Survey; and I think that his estimate is more than one-half too large; if so, ten million years would be a fair estimate, or rather conjecture, for Archæan time.

Period.	Time Duration.
Cenozoic, including Pleistocene	2,900,000 years.
Mesozoic,	7,240,000 "
Paleozoic,	17,500,000 "
Algonkian,	17,500,000 "
Archean,	10,000,000(?) "

"It is easy to vary these results by assuming different values for area and rate of denudation, the rate of deposition of carbonate of lime, etc.; but there remains, after each attempt I have made that was based on any reliable facts of thickness, extent and character of strata, a result that does not pass below 25,000,000 to 30,000,000 as a minimum and 60,000,000 to 70,000,000 as a maximum for post-Archean geologic time. I have not referred to the rate of development of life, as that is virtually controlled by conditions of environment."

"In conclusion, geologic time is of great but not of indefinite duration. I believe that it can be measured by tens of millions, but not by single millions or hundreds of millions of years." (*Journ. Geol.*, Vol. I, 1893.)

For the latest estimates as to the duration of the Glacial period see *AMERICAN NATURALIST*, March, 1894, p. 263.

The Lignites of Southern Chili.—After having made a field study of the lignitic formation in the southern part of Chili, M. Noguès reports to the Société Scientifique of Chili that these lignites certainly do not belong to the Permo-carboniferous age, as has been stated, but are of a much later age. They constitute a long band extending in a north and south direction, parallel with the Pacific Ocean, and have been dislocated by a complex series of faults. M. Noguès extended his observations to the schisto-arenaceous system, which is found around the river Bio-Bio and its affluents, La Quilacoya and the Rio Grande, and which contains beds of true anthracite coal. Paleontological evidence shows that this system corresponds with the lower beds of the lignitic formation above mentioned. Like the lignite, also, it rests unconformably upon granite rocks and the old schists of the Cordilleras, and been subjected to movements which have produced folds, swellings and anticlinals. (*Actes de la Soc. Sci. du Chili*, Santiago, 1894.)

Lower Cretaceous Fossils from the Black Hills of Dakota.—A recent find of cycadean trunks near Hot Springs, South Dakota, led Mr. Lester Ward to investigate that locality with the view

of determining the stratigraphical position of the beds in which the fossils occur. The whole of this region consists of a series of sandstones that have been treated in the Black Hills report as the "Dakota Group." In examining a locality two miles west of Minnekahta Creek, Mr. Ward found, interstratified with the sandstones, some argillaceous shales containing a fossil flora of ferns, coniferous twigs and cycadean remains, which the author refers to the Lower Cretaceous. A further study of the plants by Prof. Fontaine and Prof. Knowlton confirms this reference. Between the horizon where these fossils were found and that of the true Dakota Group there are some hundreds of feet of sandstone and shales. (Journ. Geol., Vol. II, 1894.)

Lower Eocene Mammals near Lyons, France.—A preliminary note published by M. Charles Deperet in *Comptes Rendus*, April, 1894, states that a remarkably rich deposit of Eocene Vertebrates has been discovered in a quarry at Lissien, near Lyon. The author proposes to make these fossils the subject of a special memoir, but meanwhile, he gives the following brief summary of the most important facts:

"The [Perissodactyla] are the most numerous. At the head of the list stands *Lophiodon*, represented by three forms: one, having molars of the type named by M. Rüttimeyer, *L. rhinoceroïdes*, but the body not quite so large. A second species resembles in form *L. isselense*, but is distinguished by its inferior premolars which have the cingulum very attenuated, recalling in this particular *L. cuvieri* of Jouey. The third form has a large premolar furnished with a rudimentary internal posterior cusp, as in *L. lautricense*.

"The American genus *Hyrachyus* is represented by a type that I believe to be identical with *Lophiodon cartieri* Egerkingen, and also a species of Argenton, named by M. Filhol *Hyrachyus intermedius*.

"The group [Lophiodontidae] is still more abundant. I can only mention two Paloplotheria, one large (*P. magnum* Rüttimeyer), the other hardly larger than *P. codiciense* Gaud. to which it is evidently related, from the structure of the premolars.

"The genus *Propalaeotherium* is represented by two species, one large, identical with *P. isselanum* Cuv.; the other small, suggesting *P. minutum* Egerkingen. A small *Anchilopus* seems to be related to *A. desmarestii* Gerv. Finally, there are some inferior molars which correspond to those of the ill-defined genus *Lophiotherium* Gerv.

"Among the Artiodactyla I have noticed the molars of *Acotherulum saturninum* Gerv., and one fine demi-mandible of a *Dichobune* smaller than *D. leporinum*.

"Of the group of primitive ruminants, there are only some molar teeth which seem to be identical with *Dichodon cartierii* Egerkingen.

"But the most interesting discovery among the Ungulates is a single upper molar, differing only by its smaller size from that of the animal of Egerkingen, referred by Rüttimeyer to the American genus *Phenacodus*, under the name *P. europæus*.

"The Carnivora are represented by several types, among others a *Pterodon*, a primitive *Viverra*, with the heel of the sectorial tooth very short, as in *V. angustidens*.

"Finally, of the group of rodents, there is a fine demi-mandible of a *Sciuroides*, related to *Sc. siderolithicus* of Egerkingen.

"Among the undetermined species are some bones of Birds and Reptiles."

Geological News, Paleozoic.—According to Mr. C. Schuchert, a collection of fossils, comprising about thirty species, most of which are corals, demonstrate the undoubted presence of middle Devonian deposits in northern California. All the fossils studied are from limestone, nothing as yet being known from a sandstone or shale fauna.

The localities in which these collections were obtained have been examined by Mr. J. S. Diller. They are in Shasta and Siskiyou counties, California, and as the general strike of Devonian rocks near Kennett is in a line with outcrops of Hazel Creek and Soda Creek, over thirty miles away, it is thought that these rocks may be continuous. This would be an additional evidence for Mr. Diller's theory previously stated "that the axis of folding joins the Klamath Mountains to the Coast Range rather than to the Sierra." (*Am. Journ. Sci.*, June, 1894.)

Dr. Ludwig von Ammon has published a memoir on the Stegocephali of the Rhein-pfalz known to him. These include nine species which are referred to the following genera: *Branchiosaurus*, 2; *Apateon*, 1; *Anthracosaurus*, 1 sp.; *Archegosaurus*, 2 sp.; *Sclerocephalus*, 2 sp.; *Macromerium*, n. g. von Ammon, 1 sp. The most abundant remains belong to *Sclerocephalus*, which includes also the the largest species. *Macromerium gumbelii* von Amm. was also a large species. The memoir (published at Munich) is in 4to, and is handsomely illustrated.

Dr. Hermann Credner published in the XXth Volume of the *Abhandlungen* of the Royal Saxon Society of Science a beautifully illustrated memoir on the histology of the teeth of the Paleozoic Stegocephali with plicate dentition. The investigation is confined to the

genus *Sclerocephalus*. By removal of the osseous structure, Credner obtains beautiful casts of the vascular structures of the teeth. From this study Dr. Credner concludes that the large teeth of the *Stegocephali* are formed by the fusion of small teeth, such as are frequently present on the palatine and splenial bones of these animals.

Mesozoic.—The eastern boundary of the Connecticut Triassic is defined, according to Messrs. Davis and Griswold, by fault-lines—a combination of several intersecting faults, rather than a single irregular fault. The inferred faults may be divided into two sets, those of one set trending about north and south, and represented by three members; those of the other set trending northeast and northwest, and including two members. All five faults are believed to extend beyond the parts of the border line that they determine into the area of the crystalline or Triassic rocks. (Bull. Geol. Soc. Ann., Vol. V, 1894.)

In a paper in the Journal of the Philadelphia Academy, Prof. Cope describes several Pycnodont fishes from the Wichita Cretaceous bed of western Oklahoma, and a Lepidotid from the Trinity formation of Texas. He also describes part of a tarsometatarsus of a bird from a probable neocene bed of Vancouver Island, under the name of *Cyphornis magnus*. He thinks it is allied to the Pelicans, but the bone is as large as the corresponding part of the American Ostrich.

A collection of Neocomian invertebrates from Kansas yields upon examination 17 new and 4 rare species. Among them is a large, apparently nereid, worm, and a well-preserved specimen of *Trochus texanus* Roem. The fossils are described and figured by Prof. F. W. Cragin in the Am. Geol., Vol. XIV, 1894. Prof. Cragin also reports from the same formation two new reptiles, *Pleisiosaurus mudgei* and *Plesiochelys belviderensis*; and three fishes hitherto undescribed, *Mesodon abrasus*, (? *Lamna*) *quinquilateralis* and *Hybodus clarkensis*. (Fifth Ann. Pub. Col. Sci. Soc., 1894.)

Cenozoic.—In the fourth part of the “*Materiaux pour l'Histoire des Temps Quaternaires*,” MM. Gaudry and Boule describe bones of Mammalia from the caves of Gorgas in the Hautes Pyrenées. They found there *Ursus spelaeus*, *Crocota maculata spelaea*, and *Canis lupus*. They embrace the opportunity of showing the graduated dentition of the Canidae from *Canis* through *Hemicyon* and *Hyaenarctus*, of which they give instructive figures.

M. Harlé calls attention to the discovery of fossil *Hyaenas* of the striped type, in the grotto of Montsaunés (Haute-Garonne). With the exception of a specimen found in the grotto of Lunel-Viel by Marcel, at the beginning of this century, there is no record of this *Hyaena* having ever been found in a cave in France. (Comptes-Rendus, Paris, 1894.)

Professor Dames, of Berlin, describes some remains of a *Zeuglodon* from Fayoum in Egypt in the *Paleontological Abhandlungen* for 1894. They consist of a left mandibular ramus and vertebrae of a species of medium size, which he regards as belonging to a species previously unknown. He calls it *Z. osiris*. He makes some suggestions as to the systematic of the Cetacea, proposing to divide the order primarily on the characters of the teeth. This view will not, however, probably replace the customary one, which regards as of more importance the skeletal characters of the Archæroceti, and relegates the dentition to a place of secondary value.

Dr. G. Capellini had added much to our knowledge of the extinct Cetacea of Italy in a number of illustrated papers. He describes several species of *Ziphius* and *Mesoplodon*, some of which are new; a Delphinoid with a long muzzle; a *Tursiops*; and the *Balæna etrusca* Cap. He also describes the remains of a new *Halitherium* (*Metaxytherium*), and a crocodile with a slender muzzle, which he refers to the genus *Tomistoma*, under the name of *T. calaritanum* Cap. The latter is represented by a fine skull, and some vertebrae and dermal scuta, and other important pieces.